JOHNSON SWITCHES

MANUFACTURED BY
INTERIOR CONDUIT & INSULATION CO.
NEW YORK

FORM 100-2-92-5M.

CATALOGUE No. 6.

INTERIOR CONDUIT AND INSULATION CO.

EDW. H. JOHNSON, PRESIDENT.

GENERAL OFFICES, 42 AND 44 BROAD STREET,

NEW YORK.

MANUFACTURERS OF

INTERIOR AND UNDERGROUND CONDUITS.

SWITCHES
AUTOMATIC SWITCHES
CUT-OUTS

AND OTHER FORMS OF

NEW, IMPROVED AND SPECIAL
ELECTRIC LIGHT, HEAT AND
POWER APPLIANCES.

BARTLETT & COMPANY,
DESIGNERS, ENGRAVERS AND PRINTERS
21 AND 23 ROSE ST., N. Y.

Interior Conduit and Insulation Co., of New York.

REPRESENTED BY

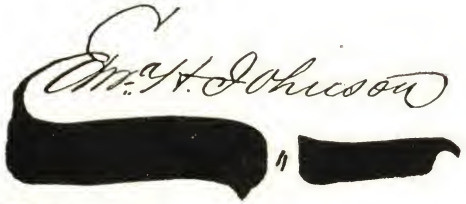
Thos. Day & Co., 222 Sutter Street, . . .	San Francisco, Cal.
Mountain Electric Co.	Denver, Col.
American Electrical Supply Co., 226 Pearl Street,	Buffalo, N. Y.
Putnam, Gay & Co., 27 East Main Street, . .	Rochester, N. Y.
Glover Electric Co., 127 West 8th Street, . .	Cincinnati, Ohio.
Central Electric Co.	Chicago, Ill.
Southern Electric Mfg. & Supply Co., 110 Baronne St.	New Orleans, La.
Chas. Gabriel, ...	Saginaw, Mich.
Walker & Kepler, 531 Chestnut Street, . .	Philadelphia, Pa.
Electrical Supply and Construction Co., . .	Pittsburgh, Pa.
Southern Electric Co., ...	Baltimore, Md.

THE JOHNSON SWITCH.

Reprint from The Electrical Engineer, February 3d, 1892.

THE JOHNSON SWITCH.

BY



NLY considered as a bit of mechanism, this switch is almost identical with the ordinary mechanic's vise, differing therefrom simply in the means provided for automatically shutting the jaws when they have been sufficiently opened by the hand to release the outer jaw from the restraining stops. The stops employed are at one and the same time the contacts and the ratchet shaped stops which determine and limit each movement of the switch.

The power employed for effecting the automatic shutting of the vise is a helical wire spring put under tension by each throw of the switch handle and operative to throw the released jaw back to its normal position with such force as to effect a positive wedging of the jaws, alternately locking the circuit closed and locking it open. The releasing of the lock is effected as in an ordinary vise, by simply turning the screw-threaded handle until the free jaw is withdrawn sufficiently to permit it to move over the stop [contact] faces.

Considered as an electric circuit-controlling device, this switch employs a principle not hitherto made available in snap switches, that is, the substitution of perfectly rigid contacts for contacts dependent upon spring pressure, and the wedging of these rigid contacts between two immovable jaws, instead of between yielding springs. The mechanical arrangement thus established is precisely the same as would result from cutting a wire in two, flattening the severed ends, placing them the one upon the other and then wedging them tightly together in a bench vise. Of course it can be seen at a glance that electrically considered, we have contacts which under heat must, by natural expansion, be more perfectly united and hence effect a reduction of the heating, thus practically removing the contact surfaces as factors of carrying capacity and raising the capacity of the switch to the actual safe-carrying capacity of the metal employed in the terminals;

whereas in all other snap switches, spring pressure being the only opposing factor, the effect of contact heating is diametrically opposite; the heat is communicated to the contact springs, which, in consequence, loose their temper and therefore their pressure, thus lessening the contact surface, increasing the heat and effecting the quick destruction of the switch. The carrying limits of all such switches is thereby confined to the safe non-heating limit of the contact surfaces, and even this is an indeterminable

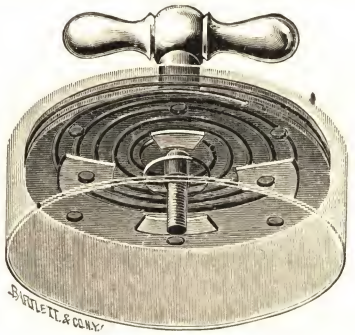


FIG. 1.

FIG 2.

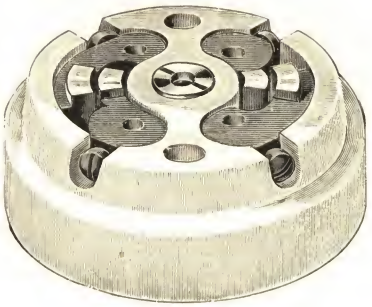


FIG. 3.

because variable quantity, it being subject to the omnipresent element of surface corrosion.

The "breaking" capacity is so high as to render the switch practically independent of anv electro-motive force ordinarily employed in multiple systems of distribution, whether for light or power. The reason for this is two-fold:

First. The gun-trigger quickness and positiveness of the break, and

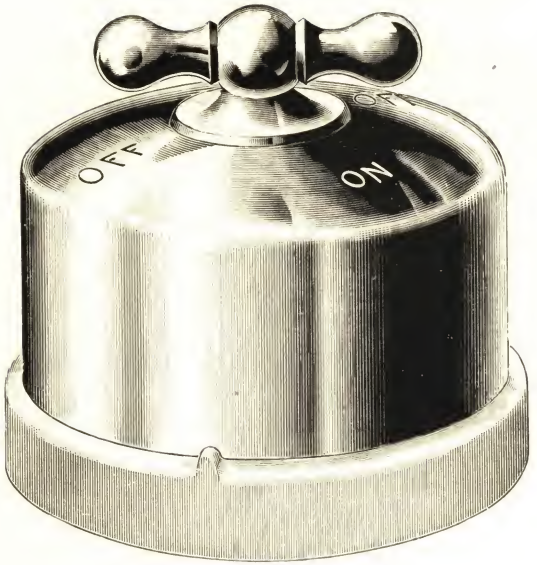
Second. The fact that the arc traverses a path twice the length of the switch movement. The means by which this result is accomplished are simple, and are shown on the face of the contact terminals.

A test of the 100 ampere switch on a 500 volt railway circuit showed that the switch would break a current of 100 amperes and 500 volts. Each wire as will be seen in Fig. 3, is fitted with a terminal and these are arranged in two groups or pairs with their contact surfaces parallel with each other; these surfaces are slightly beveled, presenting somewhat of a ratchet form. It is obvious that if each pair of these parallel pieces are bridged by holding a separate metal plate across their faces, the circuit will be closed; these separate plates are carried upon the inner surface of the movable jaw [see Fig 1]. They are so held and shaped as to give them a slight rocking motion to the end that they may seat themselves with equal firmness upon each of the lower terminals. The smaller plates in Fig. 1 are merely stops so arranged

as to seat upon but a single one of each pair of the terminals, thus failing to bridge or unite the pairs and consequently leaving the circuit locked open. Fig. 2 is merely an insulating shield. It will now be apparent that if the two plates are united by means of the screw which passes through the handle, or main vise screw, [Fig. 1] and the upper plate is turned on its operating screw, the two plates will wedge together and since the contact surfaces are slightly raised above the general surface that this wedging will take place on the contact faces. Whether the first action will be to effect a closing of the circuit by bridging the terminals with the broad plates, or to leave the circuit open by wedging the non-bridging terminals, depends simply upon the chance relation of the parts when put together. In either event it is evident that whether the switch is open or closed it has attained a dead stop and no amount of effort to turn it beyond this point will avail. But now, if instead of turning the plate itself, the handle be turned, we will have the upper plate gradually withdrawn until the jaws are wide enough apart to permit the contact plates to pass over the highest portion of the beveled terminal faces; the upper plate is thus freed to rotate with the screw and does so with the vigor and snap of a gun trigger by virtue of the tension spring connecting it with the handle and located on its top surface away from the contact surfaces of the switch. The effect of this quick rotation of the plate on its screw is of course to run it down again on the screw to its wedging position and consequently to stop it there with the switch open or closed as the case may be. Each alternate movement always in the same direction thus effects an alternating opening and closing of the circuit.

The entire arrangement of the switch is happy in that each and every part is readily accessible from the face of the switch, and they are all exposed by the removal of a single main screw which passes through the switch handle and pins it and all the working parts to the base plate; by the removal of this screw the whole switch movement falls into the open hand, thus leaving the base plate with its terminal contacts perfectly unobstructed, and rendering the insertion or removal of the wires a most convenient matter.

The inventor of this switch has had for more than five years the firm conviction that the use of spring contacts was contrary to good practice, and so long ago as 1886 made a number of experimental switches in which he sought to incorporate the new principle. Press of other duties, however, compelled the laying aside of the work until recently when it was again taken up and satisfactorily concluded. He now tenders this device to the electrical engineering profession and the electrical industry in the firm belief that a good and valuable service has been rendered.



THE fact that an entirely new principle is embodied in the Johnson Switch enables us to manufacture a 50 Ampere Switch the exact size of the above illustration.

THE fact that an entirely new principle is embodied in the Johnson Switch enables us to manufacture a 100 Ampere Switch the exact size of the above illustration.

THE JOHNSON SWITCH possesses the following remarkable characteristics worthy of special consideration.

1st. It does not depend upon springs for maintenance of contact. The contacts are rigid and held firmly in vise jaws. Heating, arising from any cause, will expand the contact metal between the unyielding jaws and result in more intimate contact, and therefore in reducing the heat; whereas in all existing switches, such heating takes the temper from the contact springs, and thereby so impairs the contact as to further augment the heating, and effect the final destruction of the switch.

2d. The movement is independent of the contact pressure, therefore, under all circumstances requiring the same force to effect the operation of the switch. Furthermore, the force required is only such as the thumb and finger can easily exert, whatever be the capacity and size of the switch.

3d. The celerity of the opening and closing is so great as to render the switch practically independent of electro-motive force. It will break a high voltage current as efficiently and apparently with as little sparking as one of low voltage.

4th. It is so effective that even the huge jack switches employed on dynamos and in stations, are distanced in efficiency, space, cost and general utility. It will inevitably supersede these, to the great advantage of the economy and appearance of dynamo and central station switch boards.

5th. Its construction is so simple and so solid as to elicit from a prominent electrician the characterization "engine-made," as distinguishing it from the punch and die work hitherto employed in switch construction.

6th. The switch can be connected by simply unscrewing the handle and taking off the cover; but if it is desired to get at the working parts, it is only necessary to take out the central pivotal screw.

7th. It costs very much less per ampere capacity than any other switch.

8th. The principle and the details of construction are patented or applied for. We will deal promptly with pirates.

MECHANICALLY PERFECT. NEAT. CHEAP. EASILY MOUNTED.

EASILY WIRED. ALWAYS RELIABLE.

A DEADLY PARALLEL.

THE JOHNSON SWITCH.—A NEW PRINCIPLE IN SNAP SWITCHES.

JOHNSON SWITCHES.

The contacts are all rigid pieces held firmly between unyielding vise jaws.

Heat arising from unclean contacts expands the metals between the unyielding vise jaws thus reducing the heat by increasing the area of contact surface.

The carrying capacity is only limited by that of the metal constituting the terminals, a fixed quantity in any given size switch.

Snap movement has the quality of a gun trigger; action clean, sharp, positive and unchangeable by use or time.

Length of "breaking throw" one-quarter of switch circumference, path of arc twice the length of throw.

Good for 500 volts.

Character of workmanship "Engine Made."

Dimensions the smallest per unit of capacity yet produced. 50 amperes, diameter 3″ height 2½″ cubic contents 18.

OTHER SWITCHES.

The contacts are invariably flexible and are maintained under spring pressure capable of yielding.

Heat arising from any cause impairs the temper of contact springs, thus reducing area of contact surface, augmenting the heat and inviting the quick destruction of the switch.

The carrying capacity is limited by the area of contact and the pressure of the spring, a variable quantity in every individual switch.

Snap movement subject to variable friction, therefore sluggish, changeable and inelastic.

Length of "breaking throw" variable, but never exceeding one-quarter, path of arc never greater than length of throw.

Not reliable for an E. M. F *above 120 volts.*

Character of workmanship "Punch and Die."

Dimensions variable. One standard—40 amperes, diameter 5½″ height 4¾″ cubic contents 114.

THE EDISON ELECTRIC ILLUMINATING CO., OF NEW YORK.

General Offices, Pearl, Cor. Elm Street.

New York, 28 January, 1892.

R. R. Bowker, Esq.,
First Vice-President.

Dear Sir:—In regard to the Johnson Vise-lock Switch, which has now been thoroughly tested both as to its carrying capacity and its durability in actual service, I beg to report, that we find that the switch will carry, and successfully break, a current twice its rated capacity, and that it appears, that the switch is perfectly reliable when operated continuously at fifty per cent. above its rating.

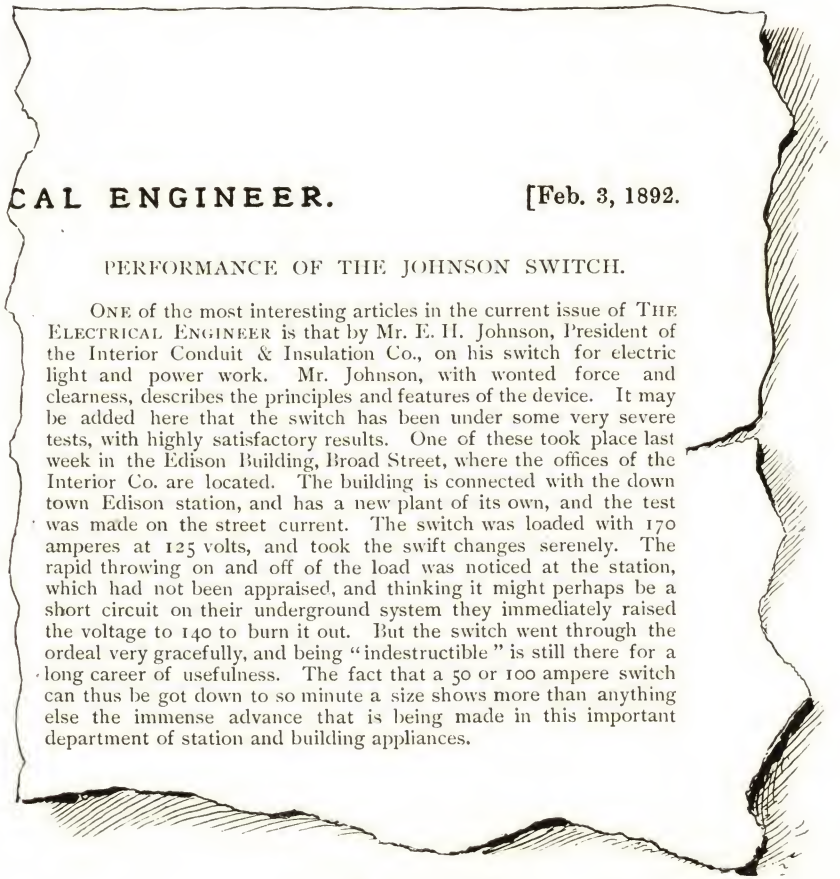
The switch will furthermore break a current of twice the normal pressure of 120 volts, when carrying its rated current or even considerably above its rating.

The switch is built on the double pole principle and is probably the smallest switch of its capacity made, and has therefore become quite popular with our Wiring Department. It has had the test of several months' trial as well as of severe experiment and it would seem that its peculiar features make it about the most desirable house switch ever brought to our notice.

Very truly yours,

[Signed] J. Van Vleck,
Electrician and Chief Engineer.

Editorial from The Electrical Engineer, February 3d, 1892.



CAL ENGINEER. [Feb. 3, 1892.

PERFORMANCE OF THE JOHNSON SWITCH.

ONE of the most interesting articles in the current issue of THE ELECTRICAL ENGINEER is that by Mr. E. H. Johnson, President of the Interior Conduit & Insulation Co., on his switch for electric light and power work. Mr. Johnson, with wonted force and clearness, describes the principles and features of the device. It may be added here that the switch has been under some very severe tests, with highly satisfactory results. One of these took place last week in the Edison Building, Broad Street, where the offices of the Interior Co. are located. The building is connected with the down town Edison station, and has a new plant of its own, and the test was made on the street current. The switch was loaded with 170 amperes at 125 volts, and took the swift changes serenely. The rapid throwing on and off of the load was noticed at the station, which had not been appraised, and thinking it might perhaps be a short circuit on their underground system they immediately raised the voltage to 140 to burn it out. But the switch went through the ordeal very gracefully, and being "indestructible" is still there for a long career of usefulness. The fact that a 50 or 100 ampere switch can thus be got down to so minute a size shows more than anything else the immense advance that is being made in this important department of station and building appliances.

ELECTRIC LIGHT SWITCHES

OF SMALL CAPACITIES ON INCOMBUSTIBLE PORCELAIN BASES.

No. 784, Single Pole.
No. 785, Double Pole.
Diameter of Base, $2\frac{7}{16}$ inches.

No. 840.
Single Pole.
Diameter of Base, $1\frac{3}{4}$ inches.

No. 787.
Double Pole.
Diameter of Base, $3\frac{1}{4}$ inches.

THE BEST SWITCHES FOR THE LEAST MONEY.

IN addition to the switches heretofore described, we manufacture a line of switches of smaller capacities, constructed upon the *principle depending upon spring pressure for the maintenance of contact*, which in design, workmanship and the high quality of the materials employed in their construction, at once places them in the front rank of switches of their class. These switches are all mounted on Incombustible Porcelain Bases, have Brass Covers and Keys, and present a neat and attractive appearance.

PRICE LIST OF JOHNSON SWITCHES.

		Pol. Brass.
No. 960	Double Pole Switch, Capacity 50 Amperes, ...	$5 00
No. 962	" " " " 100 "	7 00

PRICE LIST OF SWITCHES ILLUSTRATED ON PAGE 12.

		Plain.	Pol. Brass.
No. 840	Single Pole Switch, Capacity 2 Amperes, ...	$0 52	$0 55
No. 784	" " " " 5 "	80	85
No. 785	Double Pole " " 10 "	1 10	1 15
No. 787	" " " " 25 "	3 00	3 10